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Three million years of ice sheet history from interior East Antarctica.

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How has the Antarctic Ice Sheet contributed to changes in global ice volume/sea level since the Last Glacial Maximum (LGM) and over the Pleistocene? This is a question that is of central importance to significant, large-scale problems in Earth science, in particular, to the understanding of Earth's climate system, and of mantle rheology.

There is some evidence that there has been a large (20-30m) Antarctic contribution to global sea level rise since the LGM. But increasingly the direct evidence from the continent suggests that the largest part of the ice sheet, the East Antarctic Ice Sheet, has remained remarkably stable over the most recent glacial cycle.

Studies using in situ produced cosmogenic nuclides to determine deglaciation histories and ice elevation changes have focused on samples from erratics and bedrock at the coast and along vertical transects on nunataks near the coast or near major outlet glaciers. Here we present combined ^{10}Be and ^{26}Al measurements from the Grove Mountains, an isolated group of nunataks located 500 km south of Davis station at an elevation of 2000 m on the ice sheet and far from the immediate influence of any fast-moving ice stream. Our measurements indicate extremely low bedrock erosion rates, preserving a very long record of ice surface elevation changes. During the past 3 Ma, the ice sheet surface at the Grove Mountains has rarely advanced to greater than 150 m above the present-day elevation. Modelled exposure/burial histories show that the simplest hypothesis that is consistent with the measured bedrock exposure ages at

this site is lowering of the ice sheet surface over the Plio-Pleistocene at a rate of 50 m/Ma superimposed on a glacial interglacial cycle with an amplitude of 100 m. No evidence was found for an LGM ice thickness greater than present-day extent, suggesting that this interior sector of the East Antarctic ice sheet has not contributed to sea level change since the LGM.